

Analyzing Soil Properties

When making decisions about whether to fertilize (Tactic T-17), seed (Tactic T-21), or apply soil amendments (Tactic T-18), soil testing can provide important information. Sample site and background soils to:

- Determine nutrient deficiency (nitrogen, phosphorus, potassium),
- Determine whether pH conditions are suitable for plant growth and microbial activity, and
- Determine if salinity is suitable for germination and establishment of plants.

Collect 3 to 6 soil properties samples from a site to measure variability. For larger sites, it may be useful to collect 3 to 6 soil properties samples from the area of heaviest concentration, and 3 to 6 soil properties samples from an area of lighter concentration. In addition, always test background levels in 3 to 6 soil properties samples from a ***nearby unaffected area of the same soil and plant community***. Such samples are essential for making good decisions.

To collect samples, use a hand-coring tool or use a shovel to dig a soil pit to collect samples representative of the entire active layer (surface to frozen subsurface). Segregate the root material/organic mat from mineral soil layer and place in large, labeled, resealable plastic bags (e.g., Ziploc brand). Ask the soils laboratory to analyze the organic soil layer separately from the mineral soil layer. Refrigerate or preferably freeze the samples until analysis to prevent biological activity. Always compare results from similar soil layers.

Testing for Nutrients

A soil nutrient test must always be accompanied by a soil pH test so that the nutrient test results can be interpreted meaningfully. If the soil pH is extremely high or low, soil nutrients will not be readily available to plants.

Nutrient Tests

NUTRIENT	TEST METHOD	POTENTIALLY DEFICIENT NUTRIENT LEVELS IN MINERAL SOIL (ppm) ¹
Nitrogen	Potassium chloride extract or 1-N potassium or sodium acetate extract	<20
Phosphorus ²	<i>Alkaline Soils</i> (pH >7): Olsen' s extract (sodium bicarbonate)	<5
	<i>Acidic Soils</i> (pH <7): Bray P-1 extract	Compare with background levels
Potassium	1-N ammonium acetate extract	<20

1. To determine deficiency in *organic* soil/root mat layer, compare test results to background levels.
2. The soils laboratory must be instructed to test the soil pH in order to determine which phosphorus test method to use. Soil phosphorus is bound by calcium carbonate in alkaline soils and by iron and magnesium in acidic soils. Thus, soil testing for available nutrients must take these differences into account and use laboratory methods suited to these chemical disparities.

Testing for pH

Compare results to background levels near the site and to the normal range for North Slope tundra soil. If the pH is above or below normal range (5 to 8) in tundra, a soil amendment may be appropriate. A pH range of 6 to 7 is optimal for availability of nutrients in soil. However, other pH values may be normal for that area. If sample results are similar to background levels, soil amendments are unnecessary.

pH Tests

TEST METHOD	NORMAL pH RANGE IN NORTH SLOPE TUNDRA SOILS
1:1 soil-water paste	5 - 8

Testing for Salinity

If the site is near the coast or if a saline substance was spilled, test site and background soil salinity levels. Seeding or transplanting salt-tolerant plants may be appropriate for salt-affected sites if no salt-tolerant plants are growing nearby to revegetate the area. If the site is too saline for any plant growth, soil amendments may be appropriate.

Salinity Tests

TEST METHOD	SALINITY RANGE FOR NON-SALT-TOLERANT PLANTS	SALINITY RANGE FOR SALT-TOLERANT PLANTS
Electrical conductivity using saturated paste extract	0.3 - 4.0 mMhos/cm	4.0 - 9.0 mMhos/cm

APPLICABILITY

- *Spilled Substance:* All
- *Tundra Types:* All
- *Season:* Spring, summer, fall

CONSIDERATIONS AND LIMITATIONS

- Soil sampling is practicable only when the active layer is thawed.
- If more than one plant community or soil type is found on a site, additional sampling will be required.
- Comparison of results between different soil horizons and tundra types on a site is not valid. Also, samples must be compared with background results from similar soils and plant communities.

EQUIPMENT AND PERSONNEL

- Coring tool or shovel (1 worker) – to collect soil samples
- Ziploc or other plastic bags (2-gallon size) – to store samples
- Labels and notebook – Identify sample bags and soil horizons
- Cooler and blue ice – to store and ship samples to the soils laboratory